DESCRIPTION OF A NEW CYSTIGNATHOID FROG FROM NEW SOUTH WALES.

By J. J. Fletcher.

In March, 1887, Mr. A. G. Hamilton kindly sent me a large and remarkable frog (♂) from the Blue Mts., new to me, whose systematic position it was a somewhat perplexing matter to settle. With the tympanum distinct, the vomerine teeth between the inner nostrils, and the pupil vertical, it was evidently very nearly allied to *Heleioporus* and *Chiroleptes* as at present defined—and to one apparently about as closely as to the other, yet without being satisfactorily referable to either, for the first finger is not opposite to the others whereas the tympanum is very distinct. As only one specimen was forthcoming, and it was not possible to decide how far the distinctness of the tympanum was merely an individual character; and also as *H. albopunctatus*, Gr., had been recorded by two European authors as a Sydney frog—as I now think on erroneous grounds—the best course seemed to be to refer Mr. Hamilton's frog provisionally and with some doubt to Gray's species, and I accordingly did so.

Some time afterwards I had under observation, for the first time, living specimens of what was evidently *Chiroleptes platycephalus*, Gthr., and one of *C. australis*, Gr.; and in these I noticed that the pupil was horizontal and not vertical as mentioned in the B. M. Catalogue. On sending a well-preserved specimen to Mr. G. A. Boulenger with a statement of my difficulty, that gentleman with his usual courtesy kindly looked into the matter, and he has recently informed me that a horizontal and not a vertical pupil is correctly attributable to *Chiroleptes*. This point being settled, it is now clear that Mr. Hamilton's frog is more closely allied to *Heleioporus* than to *Chiroleptes*, as indeed from the more striking resemblance to the former in habit one instinctively felt.

Until recently all efforts to acquire additional information or specimens have been unsuccessful ; but in July of last year Mr. W. W. Froggatt one day brought me a living specimen evidently of the same species but of the other sex, quite as large as Mr. Hamilton's example and with the tympanum just as distinct, but with the skin less shagreened and without horny tubercles on the fingers. This specimen was found under a heap of leaves in an orchard at Thornleigh, near Sydney ; and it became very interesting to know that this fine species was a member of the batrachian fauna of the County of Cumberland. A few weeks ago Mr. R. Helms brought me a third specimen, a juvenile about half grown, forwarded by one of our Members, Mr. L. Woolrych, of Dural, near Parramatta, who found it six inches below ground; this individual also has the tympanum distinct. Finally last April I was fortunate in finding a fourth specimen near Manly; and like the three earlier specimens it was discovered quite by accident. I had been out for a day's ramble without having met with anything of particular interest, but on the way home when walking along a bush track which I have often traversed I came to a little creek crossing the track and running after recent rain when my attention was aroused partly by an unfamiliar subterranean noise, evidently that of a strange frog though hardly to be called a croak, and partly by the sight of a large frothy patch of spawn which seemed to be worth investigating. Finally close by the spawn I found a hole in the bank out of which in response to the necessary stimulus there presently emerged, to my great satisfaction, the fine frog (♂) exhibited alive at our last Meeting.

With four specimens at command, three of which have been under observation while living, there is no longer any room for doubt that the distinct tympanum is a constant character in this frog ; and hence the necessity for regarding the species not only as distinct from *H. albopunctatus*, Gr., but as not even referable to the genus *Heleioporus* as at present defined. Speaking of the auditory organ in the *Cystignathidæ* Mr. Boulenger says "it exhibits all the possible degrees of development. Several genera,

viz. *Crinia*, *Hylodes*, &c., prove that too great an importance has been attached to the modifications of this organ, and in most cases I must refuse to admit them as generic characters." It may be that it is attaching undue weight to the character "tympanum concealed" to rank it as of generic importance in *Heleioporus*. On the other hand two species of the genus are already known, and the character in question is allowed due weight in discriminating *Cryptotis* and *Phanerotis;* and therefore as the definition of the genus, as it at present stands, excludes the frog now under consideration the best course open to me seems to be to propose a new genus for it.

Reference has already been made to the fact that *Heleioporus albopunctatus*, Gr., has by two authorities been recorded as a Sydney frog, namely in the second edition of the British Museum Catalogue, and by Keferstein in his well-known paper—records the correctness of which I believe to be open to doubt on the following grounds. Mr. Krefft knew this frog well enough; nevertheless in his three lists of Australian frogs published during the years 1867-71 he gives as the habitat of *H. albopunctatus* King George's Sound; or Western Australia (particularly King George's Sound), Murray River, North Australia (?); or West and North Australia* : never does he include it among the species known to occur in New South Wales. Nor have local collectors of a later date been any more successful in finding it in this colony. It is very remarkable therefore that the single specimen from Sydney in the British Museum should stand recorded in the Catalogue as presented by Mr. Krefft; and that Keferstein's five supposed Sydney specimens should have been part of a collection supplied either by Mr. Krefft himself or by the late Dr Schuette who in his turn probably obtained all, or all but the Sydney specimens forwarded by him, from Mr. Krefft. Moreover the last of Mr. Krefft's papers appeared in "The Industrial Progress

* Evidently Mr. Krefft is only quoting most of these localities on the authority of Dr. Günther [B. M. Catalogue (first edition) and Ann. Mag. Nat. Hist. July, 1867 (3), xx. p. 54]; not so, however, in regard to King George's Sound.

of New South Wales" published about the middle of 1871, whereas Keferstein's is to be found in Archiv für Naturgesch. xxxiii. Jahrg. 1 Bd., on the title-page of which the year of publication is given as 1868. Whether some of the material was supplied without localities being given, and, as has so often been the case with other Australian animals, the writer having received it from Sydney thereupon concluded that that was the correct habitat and so recorded it; or whether Mr. Krefft was sometimes careless in labelling the specimens sent to his correspondents, it is needless to inquire. The fact remains that several of the localities given by Keferstein are unquestionably wrong. For example, besides *H. albopunctatus* he records from Sydney *Limnodynastes salmini*, *L. ornatus* (both as *Platyplectrum marmoratum* and *P. ornatum*), and *Hyla nasuta* (as well as *H. freycineti* with which Mr. Krefft would appear to have confounded it in recording *H. nasuta* as a Sydney species); whereas these species, as far as I am aware, are not to be found within the County of Cumberland nor yet even in the adjacent counties. *Crinia georgiana*, D. and B., for a purchased specimen recorded as from Sydney in the B. M. Catalogue*; and *Hyla gracilenta*, Gthr., recorded from Sydney in Dr. Boettger's "Katalog der Batrachier-Sammlung im Museum der Senckenbergischen naturforschenden Gesellschaft in Frankfurt a.M." (1892), have in my opinion no better claim for recognition as Sydney frogs. In fact it is quite evident that if the Batrachian fauna of Sydney really included all the species with which at different times by different authors it has been credited, it would comprise a very considerable proportion of all the species recorded from Australia. And *H. albopunctatus* and *Crinia georgiana* as I think should therefore be eliminated from the list of New South Wales frogs.

Little is known of the habits of *H. albopunctatus*. Like the Sydney frog described below it is evidently a burrower of very retiring habits, for Mr. Masters, Curator of the Macleay Museum,

* Still earlier [for the same specimen] by Dr. Günther [Ann. Mag. Nat. Hist. l.c. p. 53], a locality for this species never adopted by Mr. Krefft.

has been good enough to inform me that during a visit of some eight months' duration to West Australia in the year 1866 when collecting for the Australian Museum he met with this species only once, at King George's Sound after a thunderstorm with heavy rain succeeding an intensely hot day in April, when the frogs appeared in great numbers. Mr. Masters secured as many as he wanted, but he says that without much trouble he could have got a thousand individuals if he had wished. The next day they had disappeared, and he never encountered the frog again. The specimens obtained were brought to Sydney, and were possibly included in the "340 specimens referable to 39 Species of Reptiles" mentioned in the Annual Report for 1869 as added to the Australian Museum Collection as the result of Mr. Masters' visit to West Australia. From this source not improbably came the specimens of this species which Mr. Krefft distributed to his correspondents.

Philocryphus, n.g.

Allied to *Heleioporus* and *Chiroleptes;* differing from the former chiefly by the distinct tympanum; and from the latter by the vertical pupil, and the first finger not opposite to the others; as in both the diapophyses of the sacral vertebra are slightly dilated.

P. flavoguttatus, n.sp.

Habit stout. Tongue subcircular, slightly nicked and free behind. Vomerine teeth in a transverse interrupted series between the choanæ. Head broader than long; snout rounded, shorter than the orbital diameter; without canthus rostralis; nostril obviously nearer the eye than the tip of the snout; interorbital space not quite so broad as the upper eyelid, the latter warty; tympanum very distinct, about two-thirds the diameter of the eye, usually with a few small warts. Fingers blunt, free; first finger longer than second; a tubercle between the first and second, and the second and third fingers as in *L. dorsalis:* toes short, blunt, with a thick distinct basal webbing; subarticular

tubercles present, those of the fingers larger than those of the toes; inner metatarsal tubercle only present, large, compressed, blunt. Limbs short, stout; the tibio-tarsal articulation of the adpressed hind limb reaching to about the shoulder. Skin very glandular warty above; on the sides the warts more individualised, less confluent, a number of them lighter coloured, yellow during life; a short fairly defined light-coloured glandular ridge, yellow in life, above the angle of the mouth below the tympanum: beneath smooth, but with a few small scattered pale warts about the chin and throat. Upper surfaces purplish-grey or bluish-black, in spirit tending to become olive-brown, the sides of the body and the region about the vent much spotted with yellow, the light tint of contiguous papillæ sometimes confluent; belly white, throat dusky. Male without vocal sac, with the skin more shagreened, many of the papillæ on the sides and throat having a black horny capping, and in the breeding season with a longitudinal row of from seven to ten or fewer acute black horny conical tubercles on the upper surface of the first, second, and third fingers, of which the proximal one on the first finger is very large.

Three adults 79-85 mm. from snout to vent; one (juv.) 38 mm.; two of the adults are preserved in a more or less completely distended condition, measuring 61 and 65 mm. respectively across the loins.

Hab. County of Cook—Mt. Victoria, Blue Mts. *(Mr. C. Hamilton):* County of Cumberland—Thornleigh *(Mr. W. W. Froggatt)*, Dural near Parramatta *(Mr. L. S. Woolrych)*, near Manly *(J.J.F.)*.

Apart from the distinct tympanum, and the more glandular warty upper surface, this species appears to differ from *Heleioporus albopunctatus*, Gr., in respect of the glandular ridge below the tympanum, in the nostril being nearer the eye than to the tip of the snout, in the secondary sexual characters of the male, and apparently by the absence of parotoids of which I can find no trace. Cope* figures the sternum of *H. albopunctatus* as

* Batrachia of North America, pl. LXX. fig. 18.

undivided, narrowing posteriorly; Keferstein, however, figures it as broadening posteriorly and notched slightly; *Philocryphus* has it more widely and deeply notched than in Keferstein's figure, quite a bay in fact (in one specimen 5 mm. broad and about as deep), with narrow xyphisternal horns.

Being unable to carry the ova on the occasion of finding the frog, I went again on the first opportunity a week later, in the hope also of getting the female. The spawn outside the hole had failed to develop, but inside, which was partly below the level of the water, was a considerable mass in good condition.

The ova like those of *Pseudophryne* are unusually large, and the embryo has a large yolk sac; the ova are not however laid as by that species in damp places out of the water, but in large white frothy masses like the spawn of *Limnodynastes dorsalis* or *Hyla aurea*, but with the noticeable difference in the size of the individual ova. Unlike the embryos of *Pseudophryne* those of *Philocryphus* acquire large external gills before hatching, and they are ready for hatching in a shorter time (about a fortnight); from observations upon these I feel satisfied as to the correctness of my formerly expressed opinion that *Pseudophryne* embryos do not acquire functional external gills. It will be interesting to know how far *Heleioporus* and *Chiroleptes*—concerning whose life-history nothing is known at present—share in this interesting peculiarity, as at present I know of no other Cystignathoid frog with spawn of this character.

The habit of distending itself, sometimes spontaneously, always when tickled or scratched on the back, is very marked in this species. *Limnodynastes dorsalis*, *Chiroleptes platycephalus*, and *Notaden bennettii* likewise have it, and they are all burrowers. Secondarily it may be of some protective value as a deterrent to their enemies; but it is possibly of prime importance in their burrowing operations. Several times when keeping these frogs in a vivarium with several inches of loose earth on the bottom they entirely disappeared, leaving the surface so level and apparently undisturbed that without actually unearthing them their exact whereabouts was not evident.

Sometimes both the fingers and toes have apparently swollen tips; these, however, as it seems to me, are merely callosities due to wear and tear perhaps in burrowing in hard ground in a dry season.

It is remarkable that this fine species has been so long overlooked: it seems to be rare, as I have never met with similar spawn before; it is evidently shy and of very retiring habits, and where I got my specimen there was so much cover that the chance of finding specimens except by accident seemed hopeless; added to which I know of no describable croak that I can in any way connect with the frog. Nevertheless, as Mr. Woolrych noticed and reported, when the Dural specimen had his back stroked he would usually lift up his voice in a very ludicrous and surprising manner.